

A Collaborative Effort to Identify the Causative Agents of Two Waterborne Outbreaks of Gastroenteritis in Wyoming

Jennifer L. Cashdollar

Microbiologist

U.S. EPA Office of Research and Development (ORD)/National Exposure Research Laboratory (NERL)/Microbiological and Chemical Exposure Assessment Research Division

(MCEARD)/Biohazard Assessment Research (BARB)

(513) 569-7142

cashdollar.jennifer@epa.gov

Authors: Jennifer L. Cashdollar¹, G. Shay Fout¹, Daniel R. Dahling¹, Sandhya U. Parshionikar²

¹U.S. EPA ORD/NERL/MCEARD/BARB

²U.S. EPA Office of Water/Office of Ground Water and Drinking Water/Technical Support Center

Keywords: norovirus, outbreak, water, gastroenteritis, virus methods

Two outbreaks of acute gastroenteritis were reported to the Wyoming Department of Health in 2001. The first was reported in February from recent vacationers of a snowmobile lodge. The second was in October among diners of a tourist saloon. The duration and type of symptoms exhibited by the individuals affected during the outbreaks suggested that noroviruses could be the causative agent. A collaborative investigation by individuals from key federal and state agencies, as well as academic institutions, was conducted in order to determine the causative agent or agents responsible for each outbreak. Both projects had a three-pronged approach: (1) an epidemiological investigation that was performed to identify any common routes of exposure among those afflicted with gastroenteritis, (2) an environmental survey that was done on the site of each outbreak in order to determine possible sources of contamination, and (3) a laboratory analysis that was performed on well water and fecal samples.

With each outbreak, epidemiological studies revealed a close association between water consumption and illness. In addition, environmental surveys in both outbreaks determined that the water supply was vulnerable to fecal contamination. Furthermore, water samples were tested for coliform bacteria using standard methods and for enteric viruses using molecular assays based on reverse transcription polymerase chain reaction (RT-PCR) and DNA sequencing techniques. In addition, stool samples were analyzed for the presence of noroviruses. Well water samples in both cases were positive for coliforms, which are indicators of fecal pollution, while molecular assays confirmed the presence of noroviruses. In each outbreak, a single norovirus strain was identified in the well water and fecal samples, thereby linking the water contamination with the gastroenteritis.

The partnerships that were formed to complete these investigations allowed for a timely and thorough study. Additionally, the work performed by the project partners created an atmosphere that will allow for future collaborative efforts. These investigations demonstrate that the U.S. Environmental Protection Agency's (U.S. EPA) viral concentration and molecular methods, in conjunction with epidemiological and environmental analyses, are very useful in outbreak studies. The methods used in this study can be performed in most laboratories with trained

personnel and appropriate equipment, and their use would allow for routine monitoring of enteric viruses in drinking water.

Although this work was reviewed by the U.S. EPA and approved for publication, it may not necessarily reflect official Agency policy.